AGRICULTURAL NEWS LETTER

VOL. 10 - NO. 5 SEPTEMBER-OCTOBER, 1942

This publication contains information regarding new developments of interest to agriculture based on laboratory and field investigations of the du Pont Company and its subsidiary companies. It also contains published reports and direct contributions of investigators of agricultural experiment stations and other institutions as related to the Company's products and other subjects of agricultural interest.

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SYNTHETIC PLANTS HELP U.S. MEET NITROGEN REQUIREMENTS

The more recent increases in domestic capacity for synthetic manufacture of nitrogen should guarantee plenty of that product for fertilizers and every other conceivable agricultural and industrial use when the war ends.

American farmers annually require commercial fertilizers carrying enough nitrogen to supply the requirements of around 8 million 24-foot torpedoes or 10 million 600-pound bombs.

Every time a 16-inch gun is fired, 120 pounds of nitrogen goes back into the air from which it came. This means that the nitrogen needed annually by our farmers, along with such other plant-food elements as phosphorus and potash, to grow the food, feed, and fiber demanded of them, would, if converted to explosives, be sufficient for well over 7 million 16-inch shells.

In 1910 American farmers used less than one-third as much fertilizer nitrogen as they require today. The increase from 260 million pounds in 1910 has been rapid and steady; 404 million pounds in 1920; 694 million in 1930; and 866 million in 1937, the last year a complete survey was made.

If all the nitrogen needed annually on American farms had to be supplied by imported nitrate of soda, as was largely the case during the first World War, it is conservatively estimated that American farmers would require more than 2,700,000 tons of nitrate of soda during the current year.

Synthetic Nitrogen Being Used for Purposes Other Than Fertilizer

At the outbreak of the first World War, the United States did not have a single manufacturing plant to extract nitrogen from the air. However, since then Du Pont and other representatives of the chemical industry have developed nitrogen fixation plants. No longer are we almost wholly dependent on foreign sources or on the high-priced domestic organics of vegetable and animal origin for nitrogen. However, these sources, plus domestic sulphate of ammonia, continue to constitute the current wartime nitrogen-carrying materials allocated to fertilizer use. All synthetic nitrogen is being used for purposes other than fertilizer.

If it were not for the greatly expanded domestic synthetic nitrogen capacity, imports of nitrates would be utterly inadequate for our current needs. In fact, after combining both domestic and imported sources of nitrogen allocated to fertilizers, the manufacturers in that industry face some shortage for the coming season.

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Old-fashioned organics, one of the important sources of fertilizer nitrogen at this time, include the vegetable and animal proteins such as oil-seed meals, dried blood, animal tankage, and fish products. However, the trend before the present war was definitely away from these organics and toward increased use of the newer synthetic organics and inorganics. There is every indication this trend will continue after the war.

Imported nitrate of soda was the only important source of inorganic nitrogen up to and including 1900. Beginning with 1910, ammonium salts, chiefly from by-product coke ovens also became an important source of fertilizer nitrogen, nearly always exceeding the tonnage of nitrate nitrogen.

Ammoniating Liquors

As recently as 1925, not a pound of liquid ammonia was used in fertilizers manufactured in the United States but, as the result of practical application by Du Pont and others of the findings of research, more than one-fourth of the nitrogen used in mixed fertilizers in this country at the outbreak of the present war was supplied by various kinds of ammoniating liquors. These give promise of playing an even greater role in fertilizer production after the war.

Lower Prices Greatly Influence Increase in Production

The peacetime increases in consumption and the indicated shifts in forms of nitrogen were in part the result of changes in cost of that important plant food. The price of inorganic nitrogen dropped approximately 30 per cent between 1880 and 1925. Since then there has been a further reduction of nearly 50 per cent in the wholesale price of all nitrogen compounds -- both natural and synthetic -- with the exception of the natural organics. These price changes undoubtedly were a major factor in promoting the increased consumption of nitrogen fertilizers, with consequent increases in acre yields and quality of crops.

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NEW DEVELOPMENT IN HANDLING OF GREEN LUMBER

Starch, an ordinary household product made from a variety of farm-grown crops, offers an answer to the problem of making solutions of synthetic urea stick to the ends of green logs and boards to protect them against checking and splitting during the drying or seasoning process.

Urea-water solutions, used for treating lumber by soaking, are by themselves too fluid for end treatment of lumber. For instance, a 50 per cent urea solution in water is more fluid than a 50 per cent solution of alcohol in water. This means that urea-water solutions, applied to lumber by dipping, spraying, or brushing, drain off quickly, often leaving insufficient urea on the wood to give adequate end protection against checking and splitting.

Urea-Starch Paste Helps Keep Ends of Logs and Boards from Splitting

During development work conducted by chemists of the Du Pont Ammonia Department on a new method of applying urea to green lumber, a solution of starch-thickened urea, essentially an aqueous paste, was found to offer an effective means of protecting ends of logs and boards from splitting and checking during drying.

While any type of starch can be used, corn starch is perferred because it is widely available and reasonable in cost. The edible grades of corn starch are more satisfactory than the laundry grades because less is required to produce the same thickening of the solution.

Untreated logs and boards, when unprotected, tend to dry too rapidly, with resultant checks and splits. Compositions which seal the ends often prevent proper drying or do not bond themselves to the wet wood and are therefore ineffective.

Maintains A "Reservoir" of Urea

The urea-starch paste does not form a seal, but permits a relatively large amount of urea to be applied to the end of the board. This urea gradually diffuses into the wet wood and thus prevents or at least minimizes checking and splitting. The composition gradually dries to a hard, horny mass which, while resistant to mechanical action and mild weathering, permits the required transpiration of the moisture, and maintains a "reservoir" of urea. The starch does not enter the wood structure.

If the ends of the boards cannot be protected against direct rain, it is suggested that, after the urea-starch paste has dried sufficiently, the resulting crust be painted with an asphalt or protective type of paint.

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How to Make and Apply the Urea-Starch Paste

The urea-starch composition may be made by adding about 6 per cent of starch to a 40 to 50 per cent solution of urea in water. For example, to a 50 per cent solution, made of 100 pounds of urea dissolved in 100 pounds (roughly 12 gallons) of water (preferably hot water), add 6 per cent by weight or about 12 pounds of starch. The amount of starch required depends on the type used and the degree of thickness of paste desired.

Starch quickly disperses in urea solution, in which it is much more soluble than in water alone. Within about an hour, the urea-starch composition attains its maximum thickness, and is ready to apply with a trowel or brush. Heating is neither necessary nor desirable.

More than one application can be made. The paste is stable, and can be stored indefinitely if protected against evaporation. The presence of the urea prevents the starch from fermenting or molding.

At current prices of urea, which is sold for this purpose in standard packages of 100 pounds, and of starch, the cost of the urea-starch paste is about 23 to 28 cents per gallon, depending on the location of the mill.

Further Tests Necessary

The foregoing is a note on a very recent development in the course of studies on the handling of green lumber. While further tests are necessary, the need for an effective means of end protection in drying lumber is of such immediate importance that it is considered desirable at this time to present this "progress report." Whether the treatment discussed will be effective or applicable under the many different conditions encountered in mills and yards in various parts of the country, and how much of the urea-starch paste must be applied to give the desired protection, can only be established by trial.

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SYNTHETIC HORMONE SPRAY REDUCES PREHARVEST DROP OF FRUIT

An apple or a pear, no matter how perfect in color, size, and free from insect and disease blemishes, becomes just another bruised cull if it falls from the tree to the ground.

Because of the shortage of labor and other problems resulting from the war effort, the hormone sprays available to protect apples and pears from preharvest drop become more important than ever before. These sprays make it possible for apple and pear growers to reduce the number of drops, utilize labor to the best advantage, and harvest more fruit of better color and quality.

Until 1939 the preharvest drop, especially of summer and early winter apples, was regarded as an inherent and uncontrollable hazard of orcharding. Some of the best commercial varieties, such as McIntosh and Wealthy in northern apple-growing sections and Jonathan and Delicious in southern regions, have the fault of dropping large numbers of fruits. The Bartlett pear, just prior to picking and storing, has the same fault.

The first successful experiments in preventing or inhibiting preharvest drop were conducted by Dr. F. E. Gardner, P. C. Marth and L. P. Batjer of the U. S. Department of Agriculture. Various chemical compounds were tested. Results obtained with two chemicals of some 30 different compounds tested were almost unbelievable. These effective chemicals, which are the active ingredients of present synthetic hormone harvest sprays, were naphthalene acetic acid and naphthalene acetamide.

The drop on McIntosh apples was reduced from 36 to 7 per cent; on Williams from 79 to 2 per cent. Similar reductions on Jonathan and Delicious, as well as other varieties, were recorded. A modest report appeared in a scientific journal after the harvest season of 1939. So great was the grower demand for these materials the following season that manufacturers faced an immediate supplying problem.

Du Pont, to meet this demand, produced a spray trade-marked "Parmone", a solution containing just the right amount of naphthalene acetic acid, in a suitable solvent.

Naphthalene acetic acid and naphthalene acetamide dissolve very slowly in water, even in the incredibly small amount of 3.8 grams, roughly 1/7 ounce, per 100 gallons. For the grower to weigh or measure accurately such a small quantity of dry powdered chemical is impractical. Therefore, the "Parmone" marketed for the past two seasons contained 4 grams of naphthalene acetic acid per pint of solvent. This solution is easily measured and is readily dispersed and dissolved in water to produce a uniform finished spray.

"Parmone" has met a highly favorable apple and pear grower acceptance. The war has caused complications in most chemicals used by agriculturists.

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In the case of "Parmone", it has not as yet affected the hormone, naphthalene acetic acid, but instead the war has affected the supply of the solvent used in making an easily measured and effective solution. Hence, in the future it may be necessary to reduce the present amount of solvent, essential to the war, to the minimum of ¼ pint. When the present supply is exhausted, "Parmone" will then be made to contain 4 grams of naphthalene acetic acid in ¼ pint of solvent, which amount will make 100 gallons of spray, just as 1 pint of "Parmone" did in the past. Anticipating such possibility, investigations by the Du Pont Pest Control Research Laboratory clearly established by tests that such reduction of the solvent in "Parmone" had no adverse effect on the performance of naphthalene acetic acid.

Almost Like "Gluing" Apples To Trees

Numerous reports and comments on the 1940-41 tests by the various agricultural experiment stations showed conclusively, as stated by Dr. Lawrence Southwick of the Massachusetts Station, that synthetic hormone sprays "were an outstanding discovery." That a spray containing approximately 10 parts of naphthalene acetic acid in one million parts of water should have such a pronounced effect, almost "gluing" the apples to the trees, seemed fantastic not only to this investigator but to many orchardists as well. "Yet," he says, "it has been substantiated many times."

Dr. M. B. Hoffman of Cornell University Extension Service points out that with the number of fruit pickers limited, orchardists will find it necessary this year to give more than usual attention to the harvesting effort, and that the new hormone sprays may prove of considerable help. "If application of the harvest spray is properly timed, it will control the drop for from 10 to 20 days," he said. "The spray will not arrest the ripening process. The apples continue to mature at the normal rate. The treatment simply gives protection against excessive dropping during a reasonably long harvest period."

Growers occasionally have misinterpreted the purpose of hormone sprays. Since they do not delay ripening, the fruit must be picked in the proper condition for maximum keeping quality and flavor. Hormone harvest sprays allow for the proper ripening of fruit on the tree which previously was gathered in an immature state by orchardists, worried and anxious to avoid the serious losses of preharvest drop.

Pears

Last year hormone sprays were used extensively on Bartlett pears in the Pacific Northwest. In the Yakima and Wenatchee Valleys, Bartlett pears have a marked tendency to drop before properly matured. In the Yakima district in 1941 the yield estimated by the fruit storages was about 110,000,000 pounds. Actually 140,000,000 pounds were picked. This increase was largely attributed to the use of hormone sprays.

Although 1 pint of "Parmone" per 100 gallons is generally recommended for preventing preharvest drop under severe conditions, it was found that results obtained with 2/3 pint per 100 gallons of spray were not significantly different from those obtained with 1 pint, which resulted in a marked saving to the growers.

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Picking of Bartlett pears at proper maturity is absolutely essential so the fruit can ripen further in storage prior to processing, since this is the chief variety used by canners.

Other Fruit Crops

"Parmone" and other hormone sprays have been tested on apricots, cherries, plums, peaches and grapes, as well as citrus fruits. Experiments so far have not conclusively shown that hormone sprays are as effective on these crops as on apples and pears.

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CONTACT SPRAYS HELP RID GRAIN STORAGE STRUCTURES OF INSECTS

The shortage of storage space for a large part of the tremendous grain crop is resulting in use of many makeshift temporary structures, which accentuates the problem of insect control.

Cereal pests in flour mills, warehouses, and other storage places normally cost the nation nearly a third of a billion dollars annually.

Examinations in Oklahoma, for instance, made over 23 widely scattered counties, show an average of 42 per cent of all stored wheat in past years was infested with some form of harmful insect.

In most grain storage structures, contact sprays, when properly applied, reduce the number of necessary fumigations. Contact spraying is helpful in freeing both regular and makeshift structures from insects before the grain is put in for storage.

Synthetic Compound IN-930 Supplements Pyrethrum

These contact sprays usually consist of specially refined odorless petroleum oil, which acts as a carrier and solvent for toxic materials which are deadly to insects. While pyrethrum is the toxic ingredient used in many sprays, it is being supplemented by a synthetic compound derived from castor oil and known as isobutyl undecylenamide or by the more pronounceable name IN-930. Du Pont chemists, who developed this compound, say it is replacing a substantial portion of pyrethrins previously required for an active base, and is not only more efficient but is more stable and easier to standardize, thus insuring uniform killing power.

All carriers previously used to haul infested grain should be sprayed. Many railroads assign certain freight cars almost continually to carrying grain and grain products. These usually are kept free from infestation by frequent spraying or fumigation.

Since grain insects are hard to kill, those which are inaccessible to the contact spray itelf must be destroyed with a fumigant.

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NEW CHEMICAL SPRAY CONTROLS WESTERN PINE BARK BEETLES

A new and highly effective chemical spray for control of bark beetles on certain species of western pine will, when available in quantity, eliminate the hazardous and expensive method of destroying the immature broods by fire. However, orthodichlorobenzene, a chemical used in the spray, is in demand for war purposes, according to Du Pont chemists, so that widespread use of the beetle spray may not take place for some time to come.

This is true of numerous other chemicals ordinarily used for peacetime agricultural and industrial purposes. However, experiment stations and research agencies, both public and private, are continuing to assemble valuable new information for normal peacetime applications when the war demands for the ingredients involved are over. These new scientific facts are being reported — for the record — in various publications as they are developed.

For instance, the last annual report of the Chief of the U. S. Forest Service reports the discovery of the new penetrating beetle spray, consisting of one part by volume of orthodichlorobenzene and four parts of ordinary Diesel oil which, when used on infested trees of thin-barked species, kills the insects. The oil acts primarily as the vehicle and penetrant, and the orthodichlorobenzene as the lethal agency. Use of this spray reduces labor requirements and eliminates hazardous burning.

Destructive outbreaks of bark beetles continued last year in lodgepole pine stands in Utah, ponderosa pine in Oregon, and western white pine in Utah. Localized attacks occurred in South Dakota, Colorado, and California. Altogether it was necessary to treat 61,400 trees on 455,600 acres by the old method of felling the trees and burning the immature insect broods.

E. E. Carter, Chief, Division of Timber Management of the Forest Service, advises that the old method, the only one heretofore known, was to "fell and limb the brood trees, and buck the infested portions into log lengths," which are decked and burned. He adds that with some species of insects and tree hosts, the bark itself is cut off and burned. In either case, the use of fire is not only expensive but very dangerous. Extreme precautions are necessary to avoid burning up the forest that is being saved from the insects.

A series of experiments, conducted by the Coeur d'Alene Forest Insect Laboratory of the Bureau of Entomology and Plant Quarantine, demonstrated that the new orthodichlorobenzene-oil spray was quite effective. These tests were followed by actual control operations in National Forests in Utah, Idaho, and Wyoming.

The mixture was sprayed on the bark of the infested portion of the trees. From two to two-and-a-half gallons of the mixture will treat a tree 17 inches in diameter, breast high, with 40 feet of infested length. To treat an attacked

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tree, it is necessary to fell it and cut off the top so that the log containing the infestation can be rolled and all sides can be sprayed. This spray gave excellent control with thin-barked pines, especially when used properly during the spring and early summer.

The cost of Diesel oil and the difficulties of getting it into the forests in mountainous country with few roads has led to experiments in the use of emulsions of water in place of oil as carriers of the orthodichlorobenzene. To date, use of water emulsions has not given satisfactory results.

One difficulty with the use of oil is that great care must be taken to prevent leakage on pack horses. It also sometimes causes irritation of the skin of the men handling it. The back-pack cans and short hose attachments used in spraying must be kept in good condition at all times. However, Mr. Carter emphasizes the fact that the transportation difficulties are the worst ones, and if "treated" water can be substituted, there should be a great saving in trouble and some reduction in cost.

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PLANT PATHOLOGISTS TELL WHY IT PAYS TO TREAT SORGHUM SEED FOR KERNEL SMUT

One dollar invested in seed treatment to control kernel smut of sorghum can be expected to return $35 in profits, say plant pathologists of the Kansas Agricultural Extension Service.

They add that this disease can be controlled at a cost of less than half a cent an acre, and that in Kansas alone the average annual loss of $223,112 in this important feed crop could be prevented at a cost of only about $6,400 for the disinfectant.

By spending $28,571, sorghum growers could realize a million dollars every year merely by controlling this single plant disease with New Improved "Ceresan", seed disinfectants, one of the treatments recommended by the Kansas authorities.

With Texas growing more than 3,500,000 acres; Oklahoma about 1,500,000; Kansas, 1,300,000; New Mexico more than 300,000; Colorado more than 225,000; and other states varying acreages of sorghum, the economic value of proper seed treatment for this one crop alone is apparent.

Similar large returns from seed treatment can be shown for nearly all crops whose seed are subject to a myriad of fungous diseases.

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A STATEMENT ABOUT BLASTING CAPS — AND CHILDREN

The following was prepared by the Institute of Makers of Explosives, a trade association of manufacturers of commercial explosives. It is included here because of the appeal for cooperation of county agricultural agents, teachers of agriculture and home economics, and others who can assist in the campaign to safeguard children. Posters and folders will be sent on request to the Institute, 103 Park Avenue, New York, N. Y.

Last year in the United States 132 children were injured and two of them died as a result of playing with blasting caps. In the first six months of 1942, there was an increase of sixteen in the number of children injured, as compared with the similar period in 1941.

Such accidents often are avoidable. They are caused by adults carelessly leaving blasting caps about where children can find them. This carelessness persists in spite of the fact that warnings against allowing the caps to fall into the hands of children had for years been given to all purchasers of such blasting accessories. Increased efforts to warn users have been made each year since 1926 with new literature placed in each box of caps. Wording on these boxes also specifically calls attention to the dangers.

In addition, the Institute of Makers of Explosives has been conducting a movement to arouse public sentiment in the hope that parents, teachers and others who have children in their care, will co-operate in safeguarding boys and girls by instructing them in the dangers of playing with blasting caps. This movement is being participated in by school authorities in all states, by departments and bureaus of the United States government, trade bodies, state safety councils, national safety bodies, and organizations devoted to the youth of the country such as Boy Scouts and Girl Scouts. Newspapers, magazines, farm publications, trade papers and radio stations have published warnings.

County agricultural agents in every state have been active in the work of preventing these accidents. They have been able to be of great assistance because they so often advise farmers on the use of dynamite. Other agricultural workers such as home economics teachers also have an opportunity to warn parents and school authorities, who can, in their turn, relay the information to the children.

The help of these workers is being requested again this year at this time when teachers, on the reopening of many schools, will instruct their incoming pupils in the danger.

The warning found most useful is that,———CHILDREN AND OTHERS INEXPERIENCED WITH EXPLOSIVES SHOULD NOT TOUCH A BLASTING CAP. IT SHOULD BE ALLOWED

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TO REMAIN WHERE FOUND UNTIL AN OFFICER OF THE LAW OR OTHER RESPONSIBLE ADULT CAN BE LOCATED.

Blasting Caps Loaded With Powerful Explosive

Blasting caps are detonators used for firing high explosives and are necessary accessories in the important work carried on by explosives in mining, quarrying, tunneling, highway building and other work. They are loaded with a sensitive and powerful explosive. One type is a small metal cylinder, approximately ¼ inch in diameter and about 2 inches long, closed at one end and usually made of copper, although other metals are also used. This type is designed to be exploded by sparks from a fuse. Another type is known as an electric blasting cap. This is also a metallic cylinder which may vary in dimensions and color. This type always has wires attached, sealed in with sulphur, rubber, or similar materials. A very small amount of current, even that supplied by an ordinary flash light battery, is sufficient to explode a single cap.

Both types are also sensitive to impact with a hammer or stone and to fire applied to the metal cylinder.

Statistics show that when caps are found by children, many of them pick at or hammer them or throw them into bonfires. The resulting explosion often seriously injures the children, blowing off their fingers, putting out their eyes, and otherwise maiming them. Sometimes the children are killed. In many cases they are made unfit for useful work in later life.

About 86 per cent of these accidents take place in the country or in and around small towns. The children find the caps on roads or streets, on lawns, where they have been thrown, in fields, on rubbish heaps, in buildings, in the open near construction work and even in the home.

Most of the accidents last year happened to children between the ages of five and fifteen years. About 12 per cent of the victims were little girls.

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TWO WAYS TO CONTROL REDWORMS THAT ATTACK HORSES

While the horse and mule population of the United States has dropped from 25,000,000 in 1920 to about 14,500,000, of which 10,300,000 are listed as horses and colts, horse men are optimistic because of the need for horses and mules to replace mechanized power on the farm and because of increasing industrial and military requirements.

On January 1, 1940, the United States Department of Agriculture estimated the value of horses and colts of all ages at $68.21 a head, or a total valuation of $706,940,000. Mules and colts were estimated at $105.72, or a total of $448,662,000. Since well over a billion dollars of horseflesh are involved, it is simple good horse sense to keep the animals healthy and strong.

Authorities are agreed that more damage is done to horses by worms than by all other causes of disease combined. In fact, parasitologists state that it is exceptional to find a horse entirely free from redworms, also known as Sclerostomes or Palisade worms, one of the more destructive roundworm group. It is common to find many horses very heavily infested.

Town horses usually are not so heavily infested as country horses, but even in the aristocrats of the pavement a very large number of worms is frequently found.

About 40 species of redworms or Sclerostomes attack horses, donkeys, and mules. They are red in color, and are commonly found firmly attached to the wall of the intestine by means of a rather formidable mouth cup. Some are about two inches long; others are almost microscopic. All live as adults in the large intestine. Some feed on the lining of the intestine; others feed on its contents. Still others are actually cannibalistic.

Redworms damage horses in many ways, by destroying tissues, by removal of blood, by forming cysts in the gut wall, by cutting off the blood supply to the intestine, and by blockage during their migrations.

Symptoms

The symptoms caused by these naturally vary. When blood clots are formed in the vessels serving the intestine, colic is caused. When cysts are numerous in the intestinal wall, diarrhoea and various bowel disturbances are frequent and often severe. When many blood-sucking forms are present, anaemia results — and so on. As a general rule, these symptoms are chronic rather than acute. The net result is loss of condition, stamina, and of power to work.

The female redworms lay eggs — microscopic, thin-shelled bodies which pass out in an unhatched condition with the animal's droppings.

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Eggs and larvae are small and difficult to detect without a magnifying glass. Their detection should be left to a veterinarian, who has necessary equipment.

There are two ways to control this costly pest. One is to kill the parasites before they enter the animal; the other is to remove them from within the intestinal tract.

Phenothiazene Removes Worms From Intestinal Tract

Phenothiazine is now established as the most useful chemical compound to remove and destroy these worms, once they have entered the horse. The drug may be given as a mixture with regular feed or in the form of compressed pellets or as a suspension in water. The dosage varies with the weight as well as the general condition of the animal and should be determined and administered by a veterinarian. Caution should be exercised in the treatment of weak or debilitated animals.

Kill Worms In Manure Heap

To control these worms before they enter the horse, the most obvious point of attack is the manure heap. If the redworm eggs in the manure can be destroyed, a large percentage of the larvae will be prevented from re-entering a host. Ivan W. Parnell, research assistant and lecturer in parasitology, McGill University, Canada, now on active duty with the Canadian military forces, found that the most economical substance appears to be the horse's own urine, added to manure at the rate of $2\frac{1}{2}$ gallons for every 100 pounds of fresh droppings. Cows' urine may be added, although it is only about half as potent. If there is a shortage of urine, the top, sides, and bottom of the midden should be treated first, the whole mass being tightly packed to allow the heat of fermentation to kill eggs and larvae in the middle.

If urine is not available, the next most economical substance to use is a suitable nitrogen fertilizer, since some, if not all, of the cost may be recovered in added fertilizer value and increased crop yields. In this connection, Parnell found that urea was "the most lethal" of the ten carriers used in his experiments. His results suggest that about 15 pounds of urea per ton of manure, whether dry or in solution, will prove effective against Sclerostomes in fresh feces.

However, since sufficient urine is not always available and since the various nitrogen carriers that might be used are needed for other purposes at the moment, proper disposal of manure from stables and yards is even more than ever an important part of sound management. In this connection, the following from U.S.D.A. Circular 148, by Schwartz, Imes, and Wright, is of interest.

"The eggs and larvae of parasites present in manure can be more certainly and easily destroyed if the manure is stored in closed containers or boxes, having double walls and a double floor, with a 4 to 6-inch space between the walls and floor filled with sawdust, and the top of the container covered with a well-fitting lid."

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FOREIGN MATTER IN COTTON LINTERS CONSTITUTES SERIOUS HANDICAP

Time and chemicals will be conserved as a wartime measure, Du Pont chemists emphasize, if cotton linters are free from all foreign matter.

Linters, the short fibers left adhering to the cottonseed after the first ginning, are a source of cellulose in the manufacture of smokeless powder. One bale of clean linters will make enough powder to shoot 100,000 bullets. In addition, cellulose from linters are used to make certain kinds of plastics.

These linters, removed from the seed by subsequent ginning, must be of high quality, free from sweepings, leaves, sticks, and dirt. Such foreign matter constitutes a serious handicap, because valuable time and such chemicals as caustic soda and chlorine bleaches, which are in great demand for other wartime uses, are required to clean the linters.

Limited capacity for treating linters makes it imperative that as little time as possible be consumed in purification, resulting in the use of less chemicals which, in their turn, require capacity for preparation. The fact is also stressed that trash in linters may cause fires in powder plants, with consequent loss in capacity.

Clear and colored transparent and opaque colored plastics made from nitrocellulose and cellulose acetate derived from cotton linters are making valuable contributions to the war effort by substituting for critically scarce metals.

In normal times not all of the available linters were purchased for purification and processing. This enabled the manufacturer to buy only the cleanest and best, and acted as an incentive to production of high-quality trash-free linters. With the entire available supply of linters in demand today, it is necessary for manufacturers to accept a considerable tonnage of linters which they ordinarily would reject as inferior and dirty. There also is a tendency to bale up and sell any and all linters, regardless of condition.

Cotton Should Be Picked As Clean and Dry As Possible

Because of the difficulty in removing foreign material from damp seed cotton during ginning, growers should pick their cotton as clean and dry as possible as the first step toward clean linters. When storms occur before harvest, and weather is bad during the picking season, an increase in the amount of plant trash adheres to the seed cotton. Removal may be aided by use of cotton seed driers.

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Too close ginning to get a high gin outturn is sometimes practiced at the expense of quality. This results in a lowering of the value of the staple cotton itself, because cotton containing linters is discounted when sold. Then, too, some linters are lost for the war purposes indicated.

Cottonseed-oil millers are also being asked to be especially careful not to delint uncleaned or damp seed, and not to delint seed so closely that the seed coats will be scarified, and the linters consequently contain excesses of portions of the hulls.

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YEARS OF RESEARCH INSURE PLENTY OF VITAMIN D FOR POULTRY

There is no shortage of vitamin D for poultry!

Peacetime research has seen to it that there are ample supplies of vitamin D, essential to normal growth and bone development of chicks and to satisfactory volume and quality of eggs.

Du Pont chemists during the 10 years previous to the present war developed a source of vitamin D known as "D"-activated animal sterol. This product, marketed under the trade-mark "Delsterol," is made entirely from domestic raw materials, and it is always available. It can supply all demands for vitamin D in poultry-feed mixtures.

The merits of this source of vitamin D, so necessary for growth of healthy, productive poultry stock, have been verified by numerous experiments at several of the State agricultural experiment stations, at the U.S. Research Center at Beltsville, Md., and in laboratories of numerous feed manufacturers. "Delsterol" has also proved its worth in commercial poultry feeds over a period of several years, and can be used as the sole source of vitamin D in poultry rations.

Important research groups have given official recognition to the value of "D"-activated animal sterol as a source of vitamin D in poultry feed. Recently, the Committee on Animal Nutrition of the National Research Council, through its subcommittee on poultry feed, issued a report which emphasizes the importance of "D"-activated animal sterol in wartime poultry rations.

The report says that the immediate poultry-feeding problem due to the war is adjustment in rations to supply adequate protein, and vitamins A, D, and riboflavin. The subcommittee on poultry feed, made up of Dr. R. M. Bethke, Ohio Experiment Station; Dr. H. J. Almquist, California Experiment Station; and Dr. G. F. Heuser, Cornell (N.Y.) Experiment Station, points out that vitamin D can be supplied through the use of "D"-activated animal sterol and by getting the chickens outside where they are exposed to direct sunshine.

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Agricultural News Letter (Du Pont)
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SEED TREATMENT AS AN AID IN THE WARTIME PRODUCTION OF PEANUTS

By H. C. Bucha,
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War in the Pacific has cut off about half of our pre-war imports of vegetable fats and oils and has made peanut oil a major raw material in the chemical industry.

American peanut growers are doing their best to meet the greatly increased production goals set by our Federal and State Governments. They were asked at the beginning of this crop year to increase their acreage from the 1.9 million acres in 1941 to 5 million acres for the 1942 season.

Increased national production of peanuts must to a large extent be accomplished by increasing the acres devoted to peanut culture. A recent development in the field of plant pathology, however, points the way to very substantial increases in peanut production by chemical disinfection of the seed, which requires an investment in seed treating chemicals of only about five cents per acre and a negligible amount of labor.

Poor Stand One of Chief Obstacles to High Yield

Poor stand is one of the chief obstacles to a high yield of peanuts, and high yields are needed now more than ever if we are to attain the increased production of peanut oil so urgently needed in our war effort. Poor stands are due usually to the decay of the seed in the soil prior to the emergence of the young plant. While the identity of the organisms responsible for this seed decay is not known, it seems probable that both bacteria and fungi may be responsible, and that they may be carried on the seed and also in the soil.

Peanuts, and particularly the shelled nuts, which are most widely used for planting purposes, are poorly protected against invasions by microorganisms. The thin seed coat, poor in itself as a protection against infections, is usually damaged during the shelling operation, especially when done by machine. The gaps and bruises in the seed coat provide an easy entrance for seed-decaying organisms, and a decayed seed usually means a missing plant.

Early Georgia Experiments Show Value of Chemical Seed Treatment

That suitable chemicals applied to peanut seed could greatly reduce this decay and thus improve the stands, was shown more than ten years ago by experiments conducted by Mrs. Naomi C. Woodroof, Assistant Botanist of the Georgia Experiment Station. Investigations by Mrs. Woodroof during the years 1931-1933 with various lots of hand-shelled, machine-shelled, and unshelled seed treated with 2% "Ceresan" seed disinfectant and other products clearly suggested the economic possibilities of peanut seed treatment.

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Organic Mercurials In Greenhouse Tests Give Good Results

Following this lead, Bayer-Semesan Research workers carried out greenhouse tests on several types of soil and with a number of organic mercurials as seed disinfectants. As was true in Mrs. Woodroof's plantings, the improvements in stand of treated over untreated seed were frequently very substantial, often amounting to more than 100 percent.

Probably because of the low farm prices for peanuts and the generally depressed condition of agriculture at the time, interest in peanut seed treatment failed to develop.

Tests Continued In Temperature Tanks, Greenhouse, and Field

Since 1938, however, Bayer-Semesan has continued active work on the project by tests in temperature control tanks, greenhouse, and field plots. Attention has been given to such factors as soil temperature, the intervals between shelling and treating, and between treating and planting.

Increasing attention to the importance and difficulties of obtaining good stands of peanuts during recent years created a demand from growers and peanut companies for information as to the potential value of seed disinfection, which had done so much to improve the stands of cotton and numerous other crops.

Further Georgia Tests Prove Value of 2% "Ceresan"

Press Bulletin No. 488 issued January 23, 1941, by the Georgia Experiment Station, under the heading "Improve Stand and Yield of Peanuts by Seed Treatment," carried a report of field tests at Tifton, Georgia, by Dr. B. B. Higgins, Botanist of that Station. Increases in yield for treated over untreated seed of the four types of Spanish stock under test ranged from 6.8% for the hand-shelled seed to 28.7% for the machine-shelled seed.

In commenting on the tabulated data in the press release, Dr. Higgins says, "While these results cannot be considered conclusive, they do give an indication of what the grower may expect from treating Spanish peanut seed stocks with 2% 'Ceresan'".

North Carolina Experiments Show Seed Treatment Prevents Seed Decay

In a paper presented before the Southern Division of the American Phytopathological Society, Dr. Luther Shaw, Plant Pathologist of the North Carolina Experiment Station, presented the results of peanut seed treatment tests conducted in North Carolina in 1941 with 19 chemical dusts, including compounds of sulfur, mercury, copper, and a miscellaneous group. The average emergence for untreated seed in 3 tests was 23.2 per cent. The corresponding figures for seed treated with the most effective of the chemicals, an organic sulfur and 2 organic mercurials, ranged from 60.4 to 65.5 per cent.

An abstract of the paper published in Phytopathology (Vol. 32, No. 7) states that, "Observations and preliminary experiments indicated that the

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increases in emergence obtained from seed treatment resulted from prevention of seed decay prior to germination".

Organic Sulfur Compounds Enter Field – Tetramethyl Thiuram Disulfide Compares Favorably with 2% "Ceresan"

During the past few years organic sulfur compounds have entered the field of seed disinfection in a promising way, and of these tetramethyl thiuram disulfide has given encouraging results in preliminary trials. Greenhouse and field tests indicate that a 50% tetramethyl thiuram disulfide dust compares favorably at equal dosages with 2% "Ceresan".

49 Field Tests Made in Georgia and Virginia

Members of the Bayer–Semesan research staff planted field tests in 1942 on 32 farms in 6 counties of southwestern Georgia and on 17 farms in 3 counties of southeastern Virginia. The primary purpose in conducting so large a number of tests was to provide information under actual farm conditions as to the extent and frequency of the beneficial effects of peanut seed treatment observed in the greenhouse and field plots. A secondary object of the program was to compare "DuBay" 1205–FF seed disinfectant (the experimental designation for 50% tetramethyl thiuram disulfide) with 2% "Ceresan".

The 49 farm plantings were carried out as a part of the commercial planting on each farm. The tests usually consisted of 4 rows for each treated lot and 4 rows for the untreated lot, the length of the field. Emergence data were taken 5 to 6 weeks after planting by counting the plants (not hills) in 100–foot sections in each row in 3 or 4 places. The total length of rows counted for each treatment and for the untreated seed in each test was thus usually 1200 or 1600 feet. A total of about 256,000 plants was counted. A summary of the stand data is given in Tables I to V.

Tests Show Seed Treatment Reduces Losses From Seed Decay

From the information gained from these farm tests and from experiments conducted in temperature control tanks, the greenhouse, and field plots, it seems reasonably certain that chemical treatment of the peanut seed planted on many farms will frequently be effective in reducing losses in stand resulting from seed decay. It is probable that the beneficial effects of seed treatment will fluctuate from year to year, being highest when seed and soil conditions favor seed decay.

As has been pointed out by other investigators, disinfection will generally be more profitable on machine–shelled than on hand-shelled seed, because mechanical injuries to the seed coat of machine–shelled seed afford entrances for seed–decaying organisms. Additional confirmation for this observation is provided by a comparison of the data in Tables IV and V. The average percent increase in the emergence counts for 2% "Ceresan"–treated over untreated machine–shelled seed was 23.1 for the 8 farms in Table IV, whereas for the 9 farms in Table V the corresponding increase for hand–shelled seed was only 7.6 percent.

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"DuBay" 1205–FF (50% tetramethyl thiuram disulfide) at 2 ounces to 100 pounds of seed compares favorably with 2% "Ceresan" at the 3-ounce rate except possibly under exceedingly severe conditions for seed decay.

Dosages for Both 2% "Ceresan" and "DuBay" 1205–FF

Greenhouse and field plot data have shown that 5 ounces to 100 pounds of unshelled seed is probably the optimum dosage for both 2% "Ceresan" and 1205–FF. In some cases, however, this dosage may be somewhat more than the seed will retain.

Applications of 1205–FF up to the full capacity of the seed to hold the dust have not been injurious, and the product thus is not likely to cause injury even when applied at excessive rates. Being relatively non-poisonous to warm blooded animals, there is comparatively little risk of poisoning from the accidental use of the product as food by man and beast.

Simple and Inexpensive Means of Helping Produce Needed Peanut Oil

It appears that the adoption of peanut seed treatment by growers would provide a simple and inexpensive means of increasing their own farm income and of helping at the same time to meet the greatly increased demand for peanut oil during the war.

TABLE I

PEANUT SEED TREATMENT TESTS ON GEORGIA FARMS - 1942
(Emergence Counts for Machine-Shelled Seed of the Spanish Variety)

	LENGTH OF ROW COUNTED PER TREATMENT (FEET)	UNTREATED NUMBER OF PLANTS	2% "CERESAN" 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 2 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED
(1)	1200	1653	1949	17.9	1895	14.6	1904	15.2
(2)	1600	2563	3071	19.8	3126	22.0		
(3)	800	1119	1156	3.3	1320	18.0		
(4)	1600	1758	3181	80.9	3263	85.6		
(5)	1200	1599	2016	26.1	2031	27.0		
(6)	1200	1864	2995	60.7			3222	72.9
(7)	800	693	1058	52.7	863	24.5	947	36.6
(8)	1200	1202	1537	27.9	1685	40.2		
(9)	800	839	1103	31.5	1114	32.8		
(10)	1200	2463	2818	14.4			2913	18.3
(11)	2400	2137	3002	40.5	2968	38.9		
(12)	1200	1306	1814	38.9	1842	41.0		
(13)	800	580	1050	81.0	909	56.7		

COOPERATOR AND COUNTY: (1) J. F. Hayes, Terrell County; (2) H. C. Smith, Terrell County; (3) Alton Palmer, Mitchell County; (4) C. M. Pippin, Dougherty County; (5) Mrs. C. F. McKee, Dougherty County; (6) Goodman Hall, Lee County; (7) H. W. Reid, Lee County; (8) W. F. Murray, Macon County; (9) Roy Coogle, Macon County; (10) R. G. Stewart, Macon County; (11) Georgia Warehouse, Macon County; (12) Albert Davis, Sumter County; (13) Jesse Davis, Sumter County.

TABLE II

PEANUT SEED TREATMENT TESTS ON GEORGIA FARMS - 1942
(Emergence Counts for Hand-Shelled and Machine-Shelled Seed of the North Carolina Runner Variety)

	LENGTH OF ROW COUNTED PER TREATMENT (FEET)	UNTREATED NUMBER OF PLANTS	2% "CERESAN" 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 2 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED
(14)	1600	879	2248	155.7	1983	125.6		
(15)	800	629	1112	76.8	851	35.2		
(16)	1600	765			1529	99.9	1498	95.8
(17)	1600	1481	2144	44.8			2142	44.6
(18)	800	563	906	60.9	857	52.2	930	65.2
(19)	800	420	816	94.3	895	115.4		
(20)	600	326	744	128.2	654	100.6	673	106.4
(21)	1600	929	2264	143.7			2110	127.1
(22)	1600	441	1321	199.5			1173	166.0
(23)	2000	904			1053	16.5	1052	16.4
(24)	1600	1881	2436	29.5	2443	29.9		
(25)	1600	1071	1318	23.0	1221	14.0		

Peanut seed treatment tests of the first nine cooperators above (No. 14 to 22, inclusive) were with machine-shelled seed; those of the last three (Nos. 23, 24, and 25) were with hand-shelled seed. In the fourth test (No. 17, J. L. Joiner) pegs were used.

COOPERATOR AND COUNTY: (14) S. A. Smith, Terrell County; (15) James Holton, Mitchell County; (16) C. K. Cox, Mitchell County; (17) J. L. Joiner, Mitchell County; (18) J. L. Wingate, Mitchell County; (19) Bright Hayes, Mitchell County; (20) B. L. Snyder, Lee County; (21) B. F. Kaylor, Lee County; (22) C. C. Clark, Sumter County; (23) J. C. Palmer, Mitchell County; (24) B. F. Kaylor, Lee County; (25) M. McNeil, Sumter County.

TABLE III

PEANUT SEED TREATMENT TESTS ON GEORGIA FARMS - 1942
(Emergence Counts for Unshelled Seed of the Spanish Variety)

	LENGTH OF ROW COUNTED PER TREATMENT (FEET)	UNTREATED NUMBER OF PLANTS	2% "CERESAN" 5 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 5 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED
(26)	1200	2423	2940	21.3			2915	20.3
(27)	1200	2587	2991	15.6			2853	10.3
(28)	1200	2213	2298	3.8			2399	8.4
(29)	1200	1887	2550	35.1	2451	29.9		
(30)	400	560	751	34.1			647	15.5
(31)	900	1562	1927	23.4	1830	17.1		
(32)	800	1187	1461	23.1			1461	23.1

COOPERATOR AND COUNTY: (26) J. F. Hayes, Terrell County; (27) R. T. Brim, Terrell County; (28) A. D. Galt, Dougherty County; (29) C. Christian, Dougherty County; (30) C. Gaines, Dougherty County; (31) E. G. Usborne; Dougherty County; (32) J. E. Carter, Sumter County.

TABLE IV

PEANUT SEED TREATMENT TESTS ON VIRGINIA FARMS - 1942
(Emergence Counts for Machine-Shelled Seed of Various Types)

	LENGTH OF ROW COUNTED PER TREATMENT (FEET)	UNTREATED	2% "CERESAN" 3 oz./100 lbs.		"DUBAY" 1205-FF 2 oz./100 lbs.		"DUBAY" 1205-FF 3 oz./100 lbs.	
		NUMBER OF PLANTS	NUMBER OF PLANTS	% INCREASE OVER UNTREATED	NUMBER OF PLANTS	% INCREASE OVER UNTREATED	NUMBER OF PLANTS	% INCREASE OVER UNTREATED
(33)	900	599	721	20.4	756	26.2	777	29.7
(34)	600	559	749	34.0			685	22.5
(35)	900	1125	1309	16.3			1215	8.0
(36)	1200	1312	1590	21.2	1517	15.6		
(37)	1600	1519	1731	13.9			1796	18.2
(38)	1200	1369	1593	16.3			1592	16.3
(39)	1600	1050	1537	46.4			1486	41.5
(40)	1200	800	928	16.0	920	15.0		

COOPERATOR AND COUNTY: (33) G. Davis, Nansemond County; (34) F. Holland, Nansemond County; (35) J. M. Jones, Isle of Wight County; (36) Wilber Carr, Isle of Wight County; (37) Miss E. Herrin, Isle of Wight County; (38) J. Godwin, Jr., Isle of Wight County; (39) W. H. Parker, Southampton County; (40) H. A. Barrett, Southampton County.

TABLE V

PEANUT SEED TREATMENT TESTS ON VIRGINIA FARMS - 1942
(Emergence Counts for Hand-Shelled Seed of Various Types)

	LENGTH OF ROW COUNTED PER TREATMENT (FEET)	UNTREATED NUMBER OF PLANTS	2% "CERESAN" 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 2 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED	"DUBAY" 1205-FF 3 oz./100 lbs. NUMBER OF PLANTS	% INCREASE OVER UNTREATED
(41)	800	1053	1125	6.8	1135	7.8		
(42)	1200	1078	1250	15.9	1181	9.5	1232	14.3
(43)	1600	1705	1825	7.0			1836	7.7
(44)	1200	1447	1665	15.1			1683	16.3
(45)	1600	2417	2527	4.5	2537	5.0		
(46)	1200	1663	1725	3.7	1678	.9		
(47)	1600	1935	2127	9.9	2090	8.0		
(48)	1600	1871	1892	1.1			2001	6.9
(49)	800	812	849	4.5	885	9.0		

COOPERATOR AND COUNTY: (41) G. T. Rountree, Nansemond County; (42) Virginia Experiment Station, Nansemond County; (43) M. E. Joiner, Nansemond County; (44) D. C. Clements, Nansemond County; (45) W. S. Key, Isle of Wight County; (46) E. F. Babb, Southampton County; (47) G. B. Vick, Jr., Southampton County; (48) L. L. Thorpe, Southampton County; (49) J. T. Parker, Southampton County.